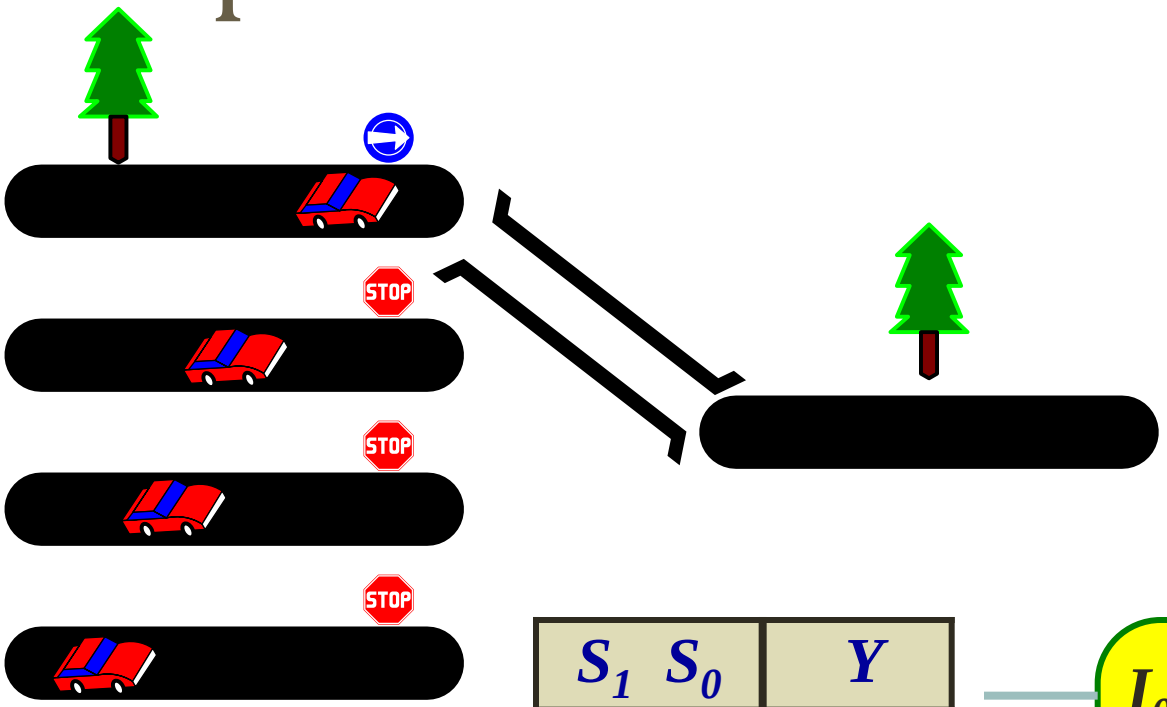
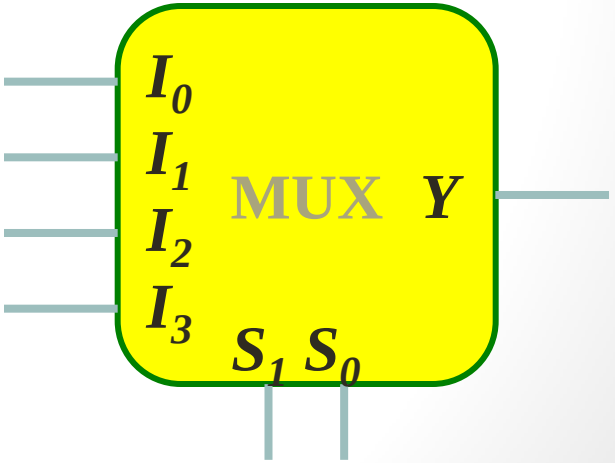
LECTURE 6

COMBINATIONAL DESIGN USING MSI DEVICES

Multiplexers

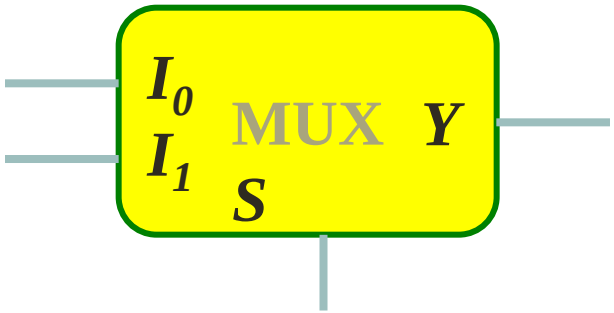


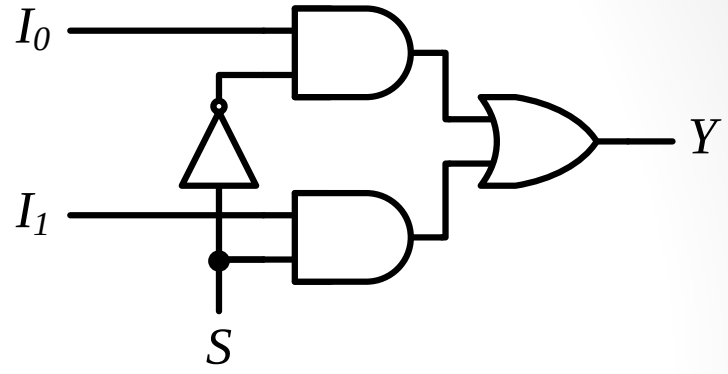
S_1	S_0	Y
0	0	I_0
0	1	I_1
1	0	I_2
1	1	I_3



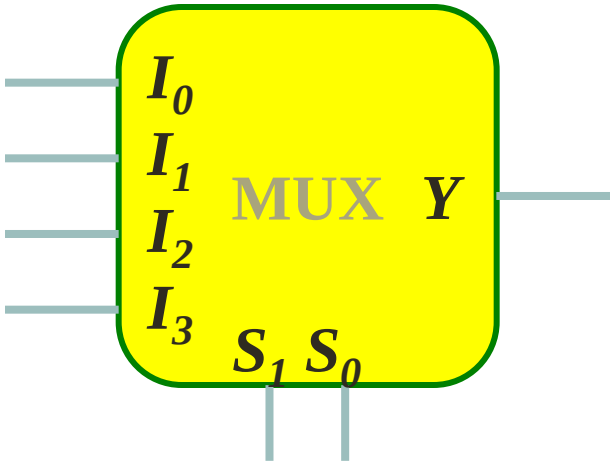
Multiplexers

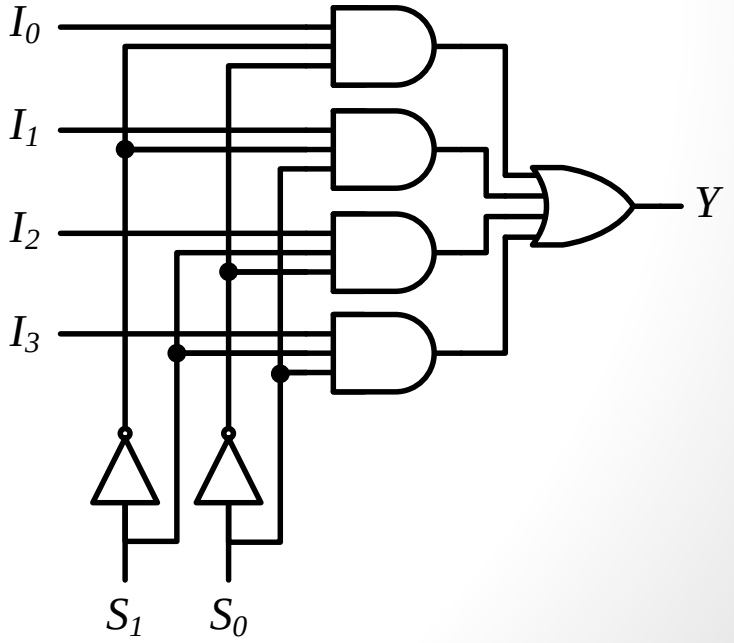
- 2-to-1 MUX





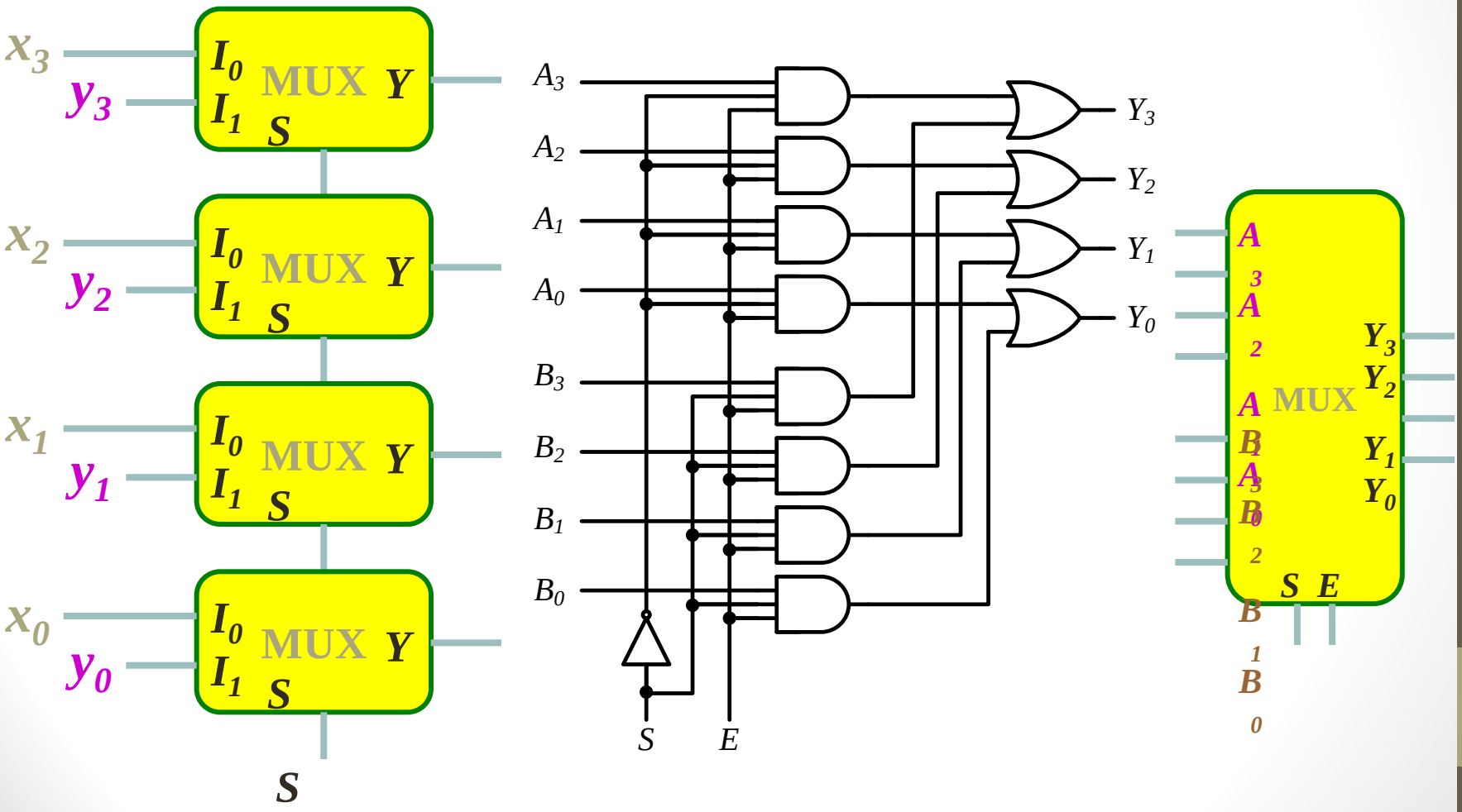
- **4-to-1 MUX**





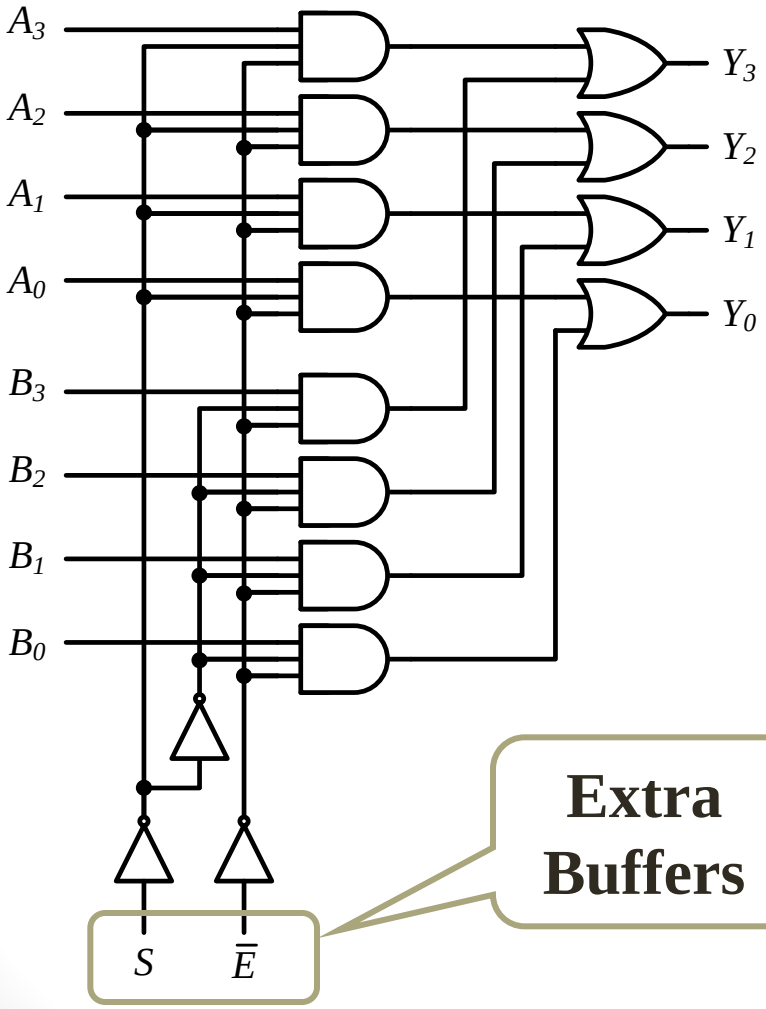
Multiplexers

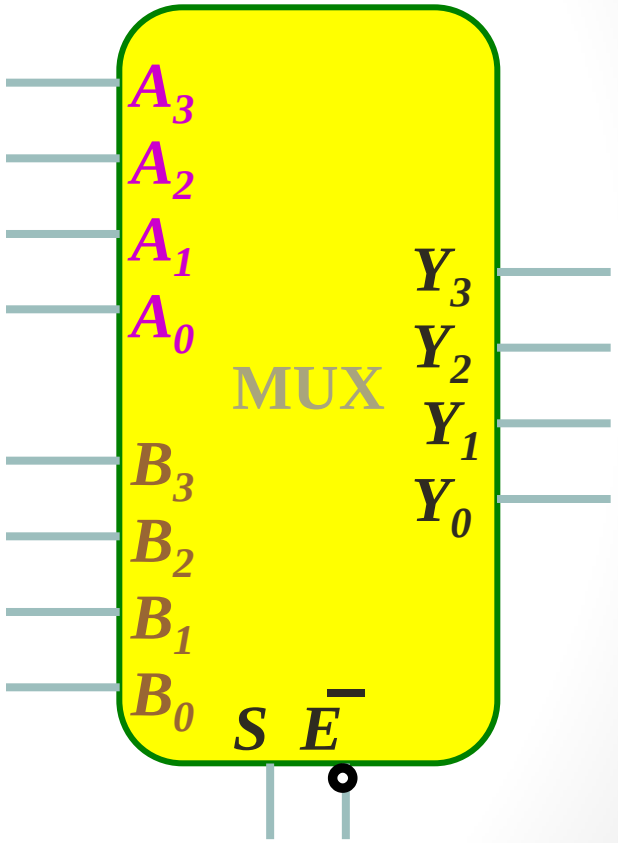
- Quad 2-to-1 MUX



Multiplexers

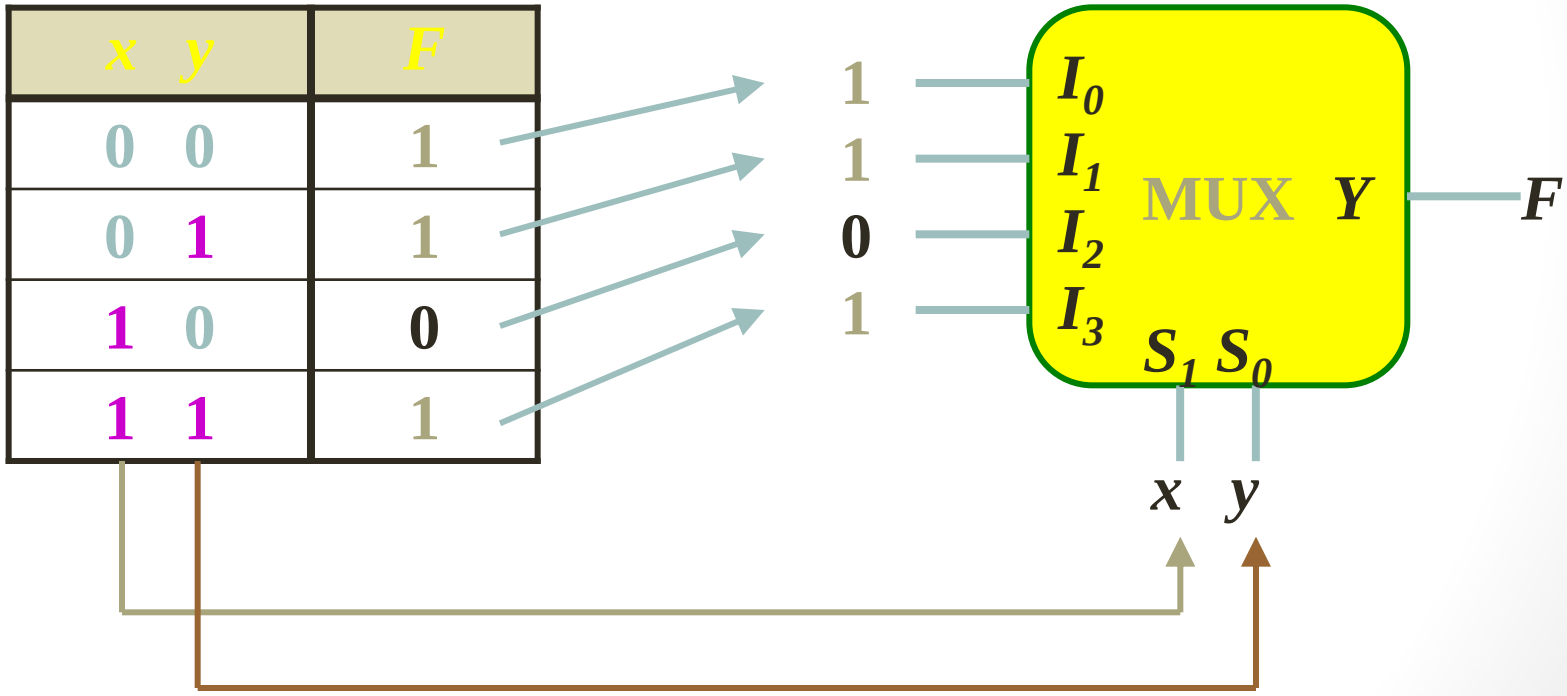
- Quad 2-to-1 MUX





Implementation Using Multiplexers

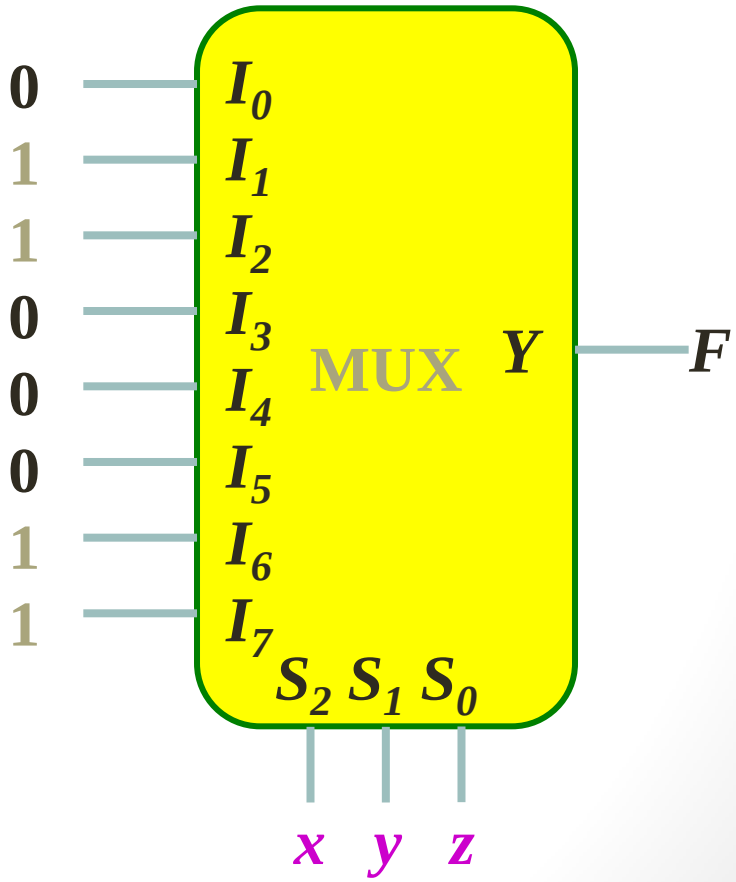
- Example
  $F(x, y) = \sum(0, 1, 3)$



Implementation Using Multiplexers

- Example
  $F(x, y, z) = \sum(1, 2, 6, 7)$

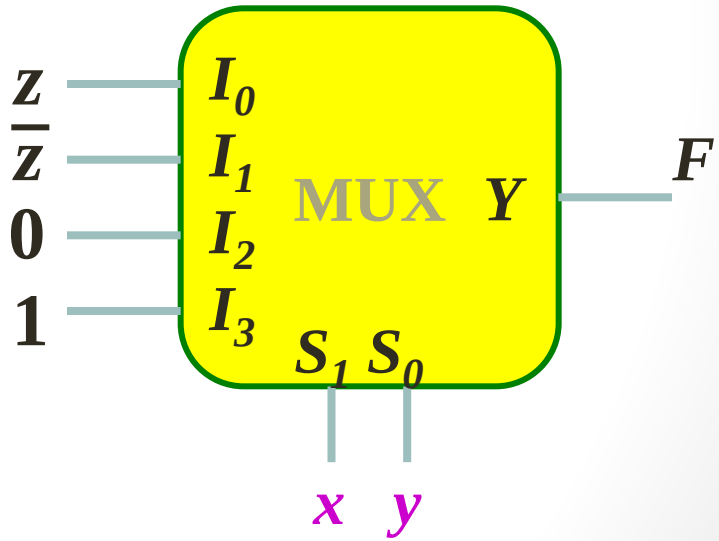
x	y	z	F
0	0	0	0
0	0	1	1
0	1	0	1
0	1	1	0
1	0	0	0
1	0	1	0
1	1	0	1
1	1	1	1



Implementation Using Multiplexers

- Example
  $F(x, y, z) = \sum(1, 2, 6, 7)$

x	y	z	F	
0	0	0	0	$F = z$
0	0	1	1	
0	1	0	1	$F = \overline{z}$
0	1	1	0	
1	0	0	0	$F = 0$
1	0	1	0	
1	1	0	1	$F = 1$
1	1	1	1	

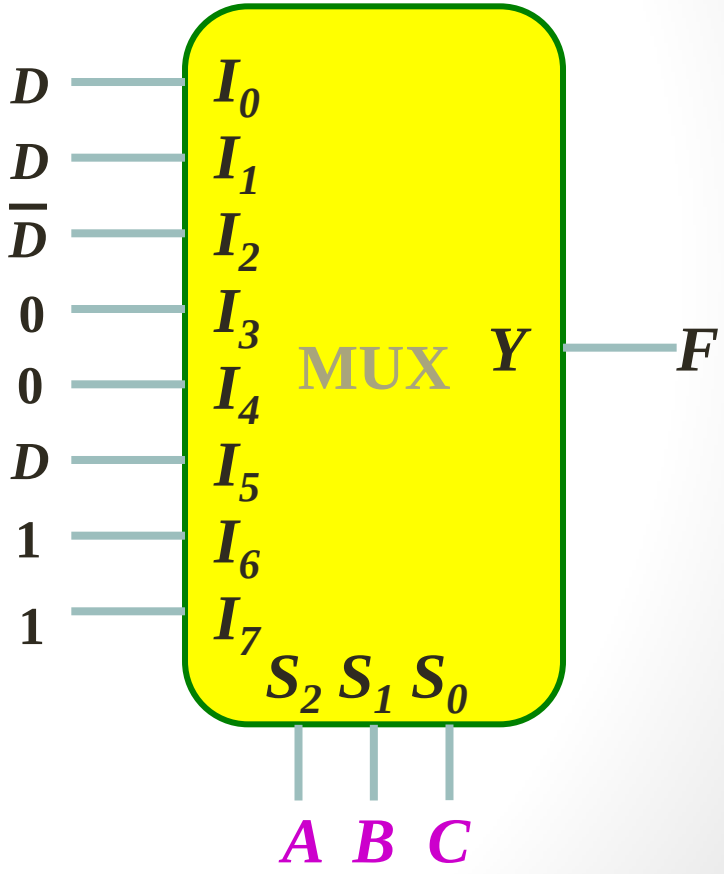


Implementation Using Multiplexers

Example

$F(A, B, C, D) = \sum(1, 3, 4, 11, 12, 13, 14, 15)$

A	B	C	D	F	
0	0	0	0	0	$F = D$
0	0	0	1	1	
0	0	1	0	0	$F = D$
0	0	1	1	1	
0	1	0	0	1	$F = \overline{D}$
0	1	0	1	0	
0	1	1	0	0	$F = 0$
0	1	1	1	0	
1	0	0	0	0	$F = 0$
1	0	0	1	0	
1	0	1	0	0	$F = D$
1	0	1	1	1	
1	1	0	0	1	$F = 1$
1	1	0	1	1	
1	1	1	0	1	$F = 1$
1	1	1	1	1	



Multiplexer Expansion

- 8-to-1 MUX using Dual 4-to-1 MUX